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CLAIMS

1.   A method for preparing polyolefins having a ratio of internal to terminal double bonds of at least 1:1 by polymerising an olefin monomer in the presence of a catalyst component having formula (1):

R"(Cp)(Cp')MQp   (1)

wherein Cp is a cyclopentadienyl group having at least one substituent that is positioned distal to the bridge; Cp' is an unsubstituted or 3 - and/or 6- substituted fluorenyl group; R" is a structural bridge imparting stereorigidity to the c atalyst; M is a metal atom from Group IVB, VB or VIB; and each Q is a hydrocarbyl group having from 1 to 20 carbon atoms and p is the valance of M minus 2;

under polymerising conditions to form a polyolefin characterised in that the olefin monomer is present at a concentration of less than 3 M/L, and polymerisation is carried out a temperature in the range of from 20 to 90°C so that the formed polyolefin has a ratio of internal to terminal double bonds of at least 1:1.

2.   The method of claim 1 wherein the c yclopentadienyl has a bulky substituent in a position distal to the bridgehead position.

3.   The method of claim 2 wherein the distal substituent on Cp is selected from n - Pr, i-Pr, n-Bu, t-Bu or Me$_3$Si.

4.   The method of any one of claims 1 to 3 wherein the fluor enyl is unsubstituted.

5.   The method of any one of claims 1 to 3 wherein the fluorenyl is symmetrically substituted.

6.   The method according to any one of claims 1 to 5, wherein the catalyst component is activated by a boron -containing activating agent.

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7.   The method according to any one of claims 1 to 6, wherein the olefin monomer comprises ethylene or propylene.

8.   The method according to any one of the preceding claims further comprising the step of forming a non-linear polyolefin.

9.   The method according to claim 8, wherein the polyolefin having a ratio of internal to terminal double bonds of at least 1:1 is carried out in a first reaction zone and the production of non-linear polyolefin is carried out in a second reaction zone in series with the first reaction zo ne.

10.   A non-linear polyolefin obtainable according to the method as defined in claim 8 or claim 9.

11.   The non-linear polyolefin according to claim 10, having long chain branching.

12.   The non-linear polyolefin according to claim 10 or claim 11, that is a cross - linked polyolefin.

13.   The method of any one of claims 1 to 7 further comprising the step of forming a functionalised polyolefin by performing an addition reaction at one or more of the double bonds.

14.   A functionalised polyolefin obtainable according to the met hod as defined in claim 13.

15.   The method of any one of claims 1 to 7 further comprising the step of forming a polyolefin foam.

16.   A polyolefin foam obtainable according to the method as defined in claim 15.